

XVII.—ADDITIONS TO THE TUNICATA AND MOLLUSCOIDEA OF THE BERMUDAS. BY A. E. VERRILL.

Most of the published information concerning the Bermudian Tunicata is by Herdman in the Reports on the Zoölogy of the Challenger Exp., vol. vi. 1882; vol. xiv, 1886; and vol xxvii, p. 141. In these volumes several ascidians are described from Bermuda, viz:

Symplegma viride, vol. xiv, p. 144, pl. xviii, figs. 7-14.

Didemnum inerme, vol. xiv, p. 265, pl. xxxiv, figs. 6, 7.

Botrylloides nigrum, vol. xiv, p. 50, pl. ii, fig. 8; iii, figs. 19-21.

Ecteinascidia turbinata, vol. vi, p. 243, pl. xxxvi, figs. 1-6.

Clavellina oblonga, vol. vi, p. 246, pl. xxxv, figs. 6-10.

Ascidia nigra (Savig.) = *A. atra* (Les., 1817), vol. vi, p. 210.

All these species and many more were obtained by our party in 1898. The total number collected is about 25 species. These have, as yet, been but partially studied.

Among the additional genera are the following: *Diazona* (*D. picta*, sp. nov.); *Botryllus*; *Leptoclinum*, several species; *Distalium*, a new species forming pyriform colonies of a bluish gray or smoky brown tint when in formalin; *Distoma*; *Amorœcium*; *Styela*, and others.

The most interesting species is that which I have named *Diazona picta*. It forms large compound clusters, usually attached to gorgonians, and often 6 inches or more in breadth and height. Each zoöid has the oral aperture surrounded by a carmine-red band and a stripe of the same color runs down one side, while the ground-color is translucent bluish or pinkish white, giving to the whole cluster an elegant appearance when living.

Additional Species.

Styela partita (Stimp.) Ver.

Cynthia partita Stimp., Proc. Boston Soc. Nat. Hist., iv, p. 231, 1852. Verrill, Amer. Jour. Sci., iii, p. 213, 1872. Rep. Invert. Anim. Vineyard Id., p. 407 [701], pl. xxxiii, fig. 246, 1874.

Halocynthia partita Verrill, Proc. U. S. Nat. Mus. for 1879, p. 197.

Distinguished externally by the alternating stripes of red and white in the apertures.

Common on the under side of stones and dead corals and in crevices of the reefs. Mass. Bay to Florida and West Indies.

Styela canopoides Heller. Transt.

Similar to *S. partita* externally. Tunic salmon-color with very fine muscle-bands; oral siphon very short, scarcely prominent; atrial siphon short conical, not far back (distance $\frac{1}{4}$ whole length of tunic). Tentacles numerous, simple, very slender. Gonads in two groups on each side, pyriform, each group attached along the sides of a slender sinuous duct.

Halocynthia rubrilabia, sp. nov. Fig. 7.

Body rather large, swollen, oblong or oblong-ovate, usually longer than high, broadly attached, with the tubes wide apart, large, and moderately elongated in extension, nearly equal, or the oral a little longer.

Test thick, firm, more or less wrinkled, when large usually covered with extraneous matters through which the reddish color often shows but faintly.

Apertures similar, rather large, both 4-angled with 6-8 small lobules in each angle; when large roughly nodulose or warty.

Tunic very muscular, the muscular bands strong, forming a very distinct network; about 30 longitudinal bands on each side.

Branchial sac has six broad plications on each side; usually 4 or 5 large stigmata to each mesh. Dorsal lamina is represented by series of small languettes. Tentacles about 20, of several diverse sizes; the 12 largest ones are thick, tapered, acute, with 16 to 20 small, simple pinnæ on each side (fig. 7; *c*). Ciliated organ U-shaped, with both ends curved one way. Siphons red; apertures four-lobed, the sinuses rounded (fig. 7; *a*).

The anus has a crenulated margin with about 12 unequal lobes, (fig. 7, *x*; *b*). Intestine forms a broad loop; liver is large, glomerate, greenish.

Gonads, in the adult, consist of 10-12 rather large glomerate lobules in two curved rows on each side, but so crowded that their serial arrangement is not very obvious; those of the left side lie mostly within the bend of the intestine. In younger examples they appear as separate, small, rounded, brown masses, arranged pretty regularly in two curved rows of 10-12 each, attached to the tunic.

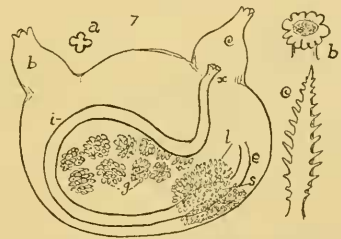


Figure 7.—*Halocynthia rubrilabia*, left side; *b*, branchial siphon; *c*, atrial siphon; *e*, oesophagus; *s*, stomach; *i*, intestine; *x*, anus; *l*, liver; *g*, gonads. *a*, Oral aperture. *b*, Anal papillæ. *c*, A tentacle, much enlarged.

Color of adult, reddish brown to pale red; the borders of the apertures bright red or rose-red, sometimes lined with a paler tint.

Greatest diameter, 35 to 50^{mm}; breadth, 20 to 25^{mm}; height, 25^{mm}; length of oral tube, 10 to 13^{mm}; diameter at end, 5 to 6^{mm}.

Common in shallow water, adhering to stones, dead shells, etc.

Halocynthia Riiseana (Traust.). Gen. *Cynthia* Savigny, 1816, non Fabr., 1808.

Cynthia Riiseana Traustedt, Vestindiske Ascidiæ simplices, Vidensk. Meddel. naturh. Foren. Kjobenhavn, 1882, p. 43, pl. v, fig. 13, pl. vi, fig. 19 (gill).

This species is allied to the last, but the tunic is flask-shaped and has longer and more divergent siphons, not so far apart, the anal one being dorsal and divaricate. The gill has 6 pairs of strong folds and 6–8 stigmata to a mesh instead of 4 or 5; tentacles 12, pinnate; anus bordered with longer papillæ; intestinal bend not so broad. Test in formalin is yellowish white; tunic pink.

One specimen, 1898. St. Thomas, W. I. (Traust.).

Microcosmus miniatus, sp. nov. Fig. 8.

Test orange-red, or bright red, rather thick and tough, leathery, ovate, somewhat flattened, attached obliquely by the base and one side, surface in the adults rudely wrinkled, often smoothish in the



young; apertures far apart, on low verrucæ, which, in the adult, are covered with rude folds and irregular nodules, as contracted.

Tunic red, rather muscular, the muscle-bands slender and forming a distinct network. Siphons not very long, divergent.

Tentacles large and strongly pinnate; about eight to ten larger ones alternate with others about one-half as large; the larger ones are bipinnate, the pinnæ being large and branched; there are also others of still smaller size. Ciliated organ (fig. 8; *d*) has the two lobes strongly spiral and incurved.

Figure 8.—*Microcosmus miniatus*, left side, partly diagrammatic; *b*, branchial siphon; *c*, atrial siphon; *e*, oesophagus; *s*, stomach; *i*, intestine; *l*, liver; *g*, gonads; *d*, duct; *x*, anus. *a*, Oral aperture. *d*, Dorsal tubercle and aperture of ciliated organ. *g*, Group of gonads from right side.

Branchial sac has 9 plications on each side, that next the endostyle being smaller than the rest. The dorsal lamina is a simple and plain band. Intestine forms a rather narrow bend, the two portions nearly or quite in contact for some distance. Liver large and bilobed.

The gonads, which are found on both sides (fig. 8, *g; g*), consist of about four double clusters of follicles arranged along each side of a curved tubular organ (*d*) attached to the tunic.

Length up to 30^{mm}; breadth, 20–25^{mm}.

Shallow water, on the reefs and under stones.

Resembles *H. rubrilabia* externally, but can usually be distinguished by the redness of the entire test.

Polycarpa multiphiala, sp. nov.

Test brown, thick, leathery, tough, roughly wrinkled in contraction, ovate, depressed, attached by most of one side, partly covered with adherent shell-sand; apertures near together, on large, short, thick, rudely wrinkled verrucae. Tunic smooth, soft, rather thick, dark brown and nearly opaque, as preserved in formalin; its muscular bands are fine and numerous, the net-work rather irregular. Siphons short and stout, enlarged distally; apertures with four large lobes.

Tentacles many, simple, slender, subequal, curved inward, pigmented on inside; 40 were counted in the type. Branchial sac has 4 broad plications on each side; 6–12 stigmata to a mesh (usually 8 or 9). Gonads attached to tunic, numerous, small, flask-shaped with two small apertures at the free end. Intestinal bend small, simple; stomach enlarged.

Length, 45^{mm}; breadth, 30^{mm}.

On the reefs, not common.

Allied to *P. Mayeri* Traust., of the Gulf of Naples.

Diazona picta, sp. nov.

PLATE LXX. FIGURE 8.

Forms large gelatinous colonies, consisting of a massive main stem from which arise more or less numerous lobes, each lobe often containing 12 to 20 zooids, which, in expansion, are much exsert above the common mass, the free portion being slender and three or four times as high as broad. Apertures, when expanded, on short terminal tubes, the oral one larger and higher than the atrial.

General color usually translucent pinkish white; oral aperture surrounded by a band of bright carmine-red, edged on both sides with flake-white; a stripe of the same carmine color extends from the oral band down the ventral side of each zooid.

Height of larger colonies 125 to 160^{mm}; breadth about the same; height of free part of zooids in life, 15 to 20^{mm}; their diameter 5 to 6^{mm}; diameter of oral tube about 2^{mm}.

Harrington Sound and Castle Harbor, just below low-tide, usually attached to gorgoniae or bryozoa.

MOLLUSCOIDEA.

BRACHIOPODA.

No species of this group, so far as I know, has hitherto been recorded from the Bermudas.

By examining carefully the under side of unbleached specimens of the delicate, foliaceous coral, *Mycedium fragile*, I found a number of small specimens, mostly immature, of a reddish species of *Cistella*. A few were also found on the under side of *Isophyllia dipsacea*, and on the base of *Oculina*. Most of these, if not all, were taken in Harrington Sound, just below low-tide mark.

Cistella cistellula (Searles Wood).

PLATE LXX. FIGURE 7.

Professor Chas. E. Beecher, who has studied these specimens, furnishes the following note:—

“The Bermuda variety agrees in form and structure with *C. cistellula* from Great Britain. It differs principally in its more uniform outline and in color. Typical examples of *C. cistellula* are of a yellowish brown hue, while the Bermuda shells are nearly white with four not clearly defined, broad, radiating bands of red.”

BRYOZOA or POLYZOA.

This group is much less abundant in the Bermudas* than on the New England coast or in the Florida and West Indian seas. Only about 20 species, mostly well known West Indian forms, were obtained by the Yale party. Most of these are incrusting species of *Escharidae*, found on the bases or dead parts of corals.

A curious large form (?*Schizoporella Isabelliana*, fig. 5), commencing as an encrusting species, becomes massive by one layer of

* Several Bermuda species have been recorded in various works, but more particularly by Busk in the Challenger Reports, vols. x and xvii. Our collection has not been sufficiently studied to warrant the insertion of a list of species new to the fauna, at this time.

zoecia growing over another, and finally, by surrounding the tubes of serpulæ or other objects and growing beyond them, forms large groups, often 6 inches high, of thin-edged tubular branches, having the thin expanded tips, in life, light pink or orange-red. Its aper-



Figure 5.—*Schizoporella Isabelliana*?; group of cells; much enlarged.

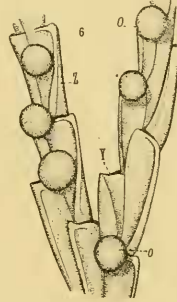


Figure 6.—*Bugula* (or *Acamarchis*) *neretina*; X, zoecia; Y, aperture; O, o, oecia.

tures have a rounded proximal emargination. The acute pedicellariæ are at the sides of the aperture. When dried this species becomes dark purplish brown or blackish. *Hippothoa*, or *Schizoporella*, *spongites* is also common in foliaceous growths on corals. Other common forms are *Amathia lendigera*, a *Lichenopora* like *L. radians*, and *Crisia denticulata*.

One large, brown, thickly-branching species of *Bugula* (*B. neretina*, fig. 6) is common. It grows four or five inches high.

A much more delicate, white *Bugula* consists of divergent fan-shaped branches attached to the alternate sides and to the tip of slender jointed stems, sometimes having alternately a long joint and a very short joint, but more frequently the short joint is lacking and the ends of the long joints are swollen, as in *Stirparia*.

There are usually 2 or 3 annulations at the base of each main branch, and these arise just below the internodes. Many of the cells have a slender distal vibraculum, or sometimes two.

It should, doubtless, form the type of a new genus or subgenus (*Caulibugula*), intermediate between *Bugula* and *Bicellaria*, on account of its articulated spines or vibracula, and related to *Stirparia* by its jointed stem. It may be named *Bugula* (*Caulibugula*) *armata*. Its zoecia are oblong and biserial, alternate; the pedicellariæ are on short pedicels, large, lateral, not numerous.

A small intricately branched cellularian, *Scrupocellaria cervicornis* (Smitt, as *Cellularia* from Florida) with antler-shaped markings on the fornix or shield, long vibracula, and 4 to 6 distal marginal spines, is common.

Biflustra dentata Busk is common on Sargassum, found on the beaches. *Steganoporella elegans* (Edw.) Smitt is common on dead corals, both in encrusting and in free foliaceous forms.

The most interesting species was a curious species of the family *Pedicellinidæ* which forms large groups on the under side of stones, or on ascidians, sponges, etc., at low-tide mark. When disturbed it bends its stalks over to one side with a rather sudden jerk, which is sure to attract the attention of the collector when the clusters are large. This motion is effected by means of strong muscles lodged in a cylindrical dilation of the base of the stalk. It belongs to the genus *Barentsia* of Hincks or *Ascopodaria** Busk.

PEDICELLINIDÆ.

Barentsia timida, sp. nov.

PLATE LXX. FIGURE 4.

A large species forming extensive groups, connected by slender round stolons, that usually branch at right angles, from under the base of each zoöid.

Stem not very long, varying in length from 3 to 5 times as long as the height of the body, its basal portion, for a length equal to about the height of the body, much enlarged, cylindrical, tapering abruptly to the slender portion, and containing a large deflector muscle; above this the slender stem gradually increases in size distally; one or two annulations at the base of the body; the enlarged basal portion is covered with numerous fine annulations; the slender part appears punctate, owing to small tubular extensions of the lighter yellow inner layer, but these usually do not cause any elevations of the exterior.

Body cup-shaped or wide campanulate. Tentacles numerous, long, slender, curled in contraction.

Height of stems, 4-6^{mm}; of basal enlargement, 0.75 to 0.90^{mm}; its diameter, about 0.3^{mm}; height of body, 1^{mm}; its diameter, 0.8 to 1^{mm}.

On under side of stones, on sponges, corallines, ascidians, etc., at low-tide, common.

This species is closely allied to *B. discreta* (Busk), Voy. Challenger, xvii, p. 44, pl. x, figs. 6-12. The latter has, however, a shorter and more strongly annulated basal cylinder and also several annulations of the stem below the base of the cup; its tentacles are only 12 in number.

* Mr. Busk (op. cit., p. 41) admits that *Barentsia* has priority of publication, although he had himself previously distinguished the genus in MSS.